

Translation from the German LanguagenewPATENT CLAIMS

1. Clamping device for a device for the production of plastic, metal, ceramic or glass parts by forming with a closed forming tool, which is characterized by the clamping device comprising at least
  - several tension hoops (2), these tension hoops (2) each being provided with at least one tension frame (2.2) of a closed contour, the tension frame being provided with two segments (2.3) arranged opposite each other at some distance, between which a forming tool (12) can be arranged, each of these segments (2.3) being provided with at least either one bearing surface (2.1) or one bearing surface (2.4), and the tension hoops (2) being each linked by at least one articulated joint (8) in order to be pivoted, the material of the tension frame (2.2) mainly consisting of a reinforced compound,
  - a bearing surface (3.1) which is located above or on the upper surface of forming tool (12) and used as support for a bearing surface (2.1) of a tension hoop (2), and
  - a device (5) which produces a clamping force of more than 3MN and is composed of several power-generating elements, the clamping force being applied between the bearing surfaces (2.1) and (2.4) of the tension hoops (2) and at least one surface area located beneath forming tool (12).
2. Clamping device according to Claim 1 which is characterized by the material of the tension frame largely consisting of materials of a tensile strength between 1500N/mm<sup>2</sup> and 4200N/mm<sup>2</sup>, an endurance strength of between 1200N/mm<sup>2</sup> and 3000N/mm<sup>2</sup> and a density of between 1.2g/cm<sup>3</sup> and 2.5g/cm.
3. Clamping device according to Claim 1 which is characterized by the device (5) being located between the bearing surfaces (2.4) of the tension hoops (2) and directly next to the forming tool (12).

4. Clamping device according to Claim 1 which is characterized by the device (5) being located between the bearing surfaces (2.4) of the tension hoops (2) and indirectly to the forming tool (12).
5. Clamping device according to Claim 1 which is characterized by the force-generating elements of the device (5) acting on the same tension hoop (2) being arranged so that the central force-applying lines of these power-generating elements of the device (5) run almost parallel and along a plane which is not substantially different from the plane parting the tension hoop (2) in a centerline axial direction.
6. Clamping device according to Claim 5 which is characterized by the force-generating elements of the device (5) being one or several hydraulic high-pressure cylinders.
7. Clamping device according to Claim 1 which is characterized by at least one tension hoop (2) being able to shift towards the tool (12) in an axial direction.
8. Clamping device according to Claim 1 which is characterized by the tension frame (2.2) mainly consisting of a nonmetal compound material with embedded reinforcements.
9. Clamping device according to Claim 8 which is characterized by the tension frames (2.2) mainly consisting of a carbon fibre compound, e.g. an intermodular fiber of a volume portion of fibres of approx. 50 - 65% in an epoxy resin matrix.
10. Device for the production of metal parts by hydroforming, at least comprising a parted forming tool and a clamping device as described in the Claims 1 to 9.

11. Component part for a clamping device of a device for the production of plastic, metal, ceramic or glass parts by forming processes with a closed forming tool, which is characterized by  
the component part at least comprising
  - a tension hoop (2), the tension hoop (2) being provided with at least one tension frame (2.2) of a closed contour, the tension frame being provided with two segments (2.3) arranged opposite each other at some distance, between which a forming tool (12) can be arranged, each of these segments (2.3) being provided with at least either one bearing surface (2.1) or one bearing surface (2.4), the material of the tension frame (2.2) mainly consisting of a reinforced compound,  
and
  - the bearing surface (2.1) corresponding with a bearing surface (3.1) located above or beneath the tool (12) and/or on the latter's surface, one or several clamping forces of a total of 1 MN minimum being applied to the component and acting between the bearing surfaces (2.1) and (2.4) on the tension hoop (2) and at least one surface located underneath or above the tool (12), the clamping force or clamping forces acting on each tension hoop (2) in such a way that the resulting from the force introduction lines runs almost parallel and in a plane which does not substantially differ from the plane parting the tension hoop (2) in a centerline axial direction.
12. Component part according to Claim 11, which is characterized by the tension hoop (2) being linked to at least one articulated joint (8) to enable it to pivot or being able to shift along the axis towards the tool (12).